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(54) **Double contacts control unit for electric plants and electric control device comprising the unit**

Steuereinheit mit doppelten Kontakten für elektrische Anlagen und elektrische Steuervorrichtung mit der Einheit

Unité de commande à contacts doubles pour centrales électriques et dispositif de commande électrique comprenant cette unité

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Description

Field of the invention

[0001] The present invention generally finds application in the field of electric control devices and particularly relates to a double-contact control unit for electric plants.

[0002] The invention further relates to an electric control device comprising such control unit.

Background art

[0003] Various forms of control units with movable contacts are known in the art, which are adapted to be connected to electric plants, namely to control starting and stopping of safety devices, such as warning, alarm or emergency devices.

[0004] Generally, the simplest control units, known as single contact units, which essentially operate as switches, comprise an insulating support which is designed to be housed in an electrical protection box, which is adapted to be anchored to a fixed or movable part of a plant.

[0005] Two pairs of mutually movable electric contacts are housed in the support, the first pair being generally fixed and connected to the terminals of an electric circuit to be switched, the second pair being attached to an actuator that causes it to move toward/away from the first pair.

[0006] The support has a pair of projections designed for snap-fitting into a seat that is specially formed in the bottom wall of the electrical box.

[0007] In more complex applications, the control unit may be designed for simultaneous management of multiple electric circuits connected to different devices of the plant, e.g. to trigger a safety circuit at the same time as the main circuit is opened.

[0008] For this purpose, two pairs of movable contacts are provided in the support, and are adapted to selectively interact with respective pairs of fixed contacts, and in this case the control unit is generally referred to as "double-contact" type.

[0009] In prior art solutions, two separate pairs of fixed contacts are housed in the support in offset positions along the movable contact actuation axis.

[0010] One example of a double-contact control unit as described above, having all the features of the preamble of claim 1, is disclosed in DE102005033166.

[0011] Accordingly, double-contact control units generally have a significantly larger axial dimension than single-contact control units, and require the provision of relatively bulky electrical boxes.

[0012] Conversely, the control unit is anchored to a fixed part of the plant by coupling elements designed for snap engagement of corresponding seats of a fastening bracket or panel.

[0013] Nevertheless, these solutions do not provide adequate protection of the control units and do not allow modular mounting of two or more control units to a com-

mon support, possibly by associating double-movable contact control units with single-contact units.

[0014] WO90/01784 discloses a switch device having an enclosure containing two microswitches located on opposite sides and in symmetric positions with respect to the actuation axis of an actuator.

[0015] Nevertheless, the two microswitches are already assembled and connected to terminals that form extensions of the connections in the microswitches contained in the enclosure, hence they have no fixed contacts. Document DE 102005033166 discloses a device according to the preamble of claim 1.

Disclosure of the invention

[0016] The object of the present invention is to overcome the above drawbacks, by providing a double-contact control unit that achieves high efficiency and relative cost effectiveness.

[0017] A particular object is to provide a double-contact type control unit that has substantially the same axial dimension as a single-contact pair type control unit.

[0018] A further object of the present invention is to provide a double-contact control unit for electric plants that can be installed in modular fashion in an electrical box.

[0019] Yet another object is to provide a control device for electric plants that allows one or more double-contact control units to be inserted in an electrical box typically sized to contain single-contact control units.

[0020] These and other objects, as better explained hereafter, are fulfilled by a double-contact control unit for electric plants, as claimed in claim 1, which is designed to be anchored to a fixed or movable support element of an electric plant, wherein the control unit comprises an insulating support having a longitudinal axis and a predetermined axial length, two pairs of fixed contacts mounted to said support in longitudinally offset positions and adapted to be connected to corresponding electric circuits associated with the plant to cooperate with respective pairs of movable contacts for opening/closing said electric circuits, each of said fixed contacts being associated with a respective electrical connection terminal, wherein the terminals of each of said pairs of fixed contacts are located in symmetric positions with respect to said longitudinal axis, at distances and inclination angles differing from those of the terminals of the other of said pairs of fixed contacts and at least partially transversely aligned therewith.

[0021] With this particular arrangement, the longitudinal offset of these pairs of fixed contacts and the axial length of said support may be reduced.

[0022] Namely, the length of the support is reduced and substantially compatible with that of common single-contact pair control units, possibly allowing accommodation in an electrical box typically formed to contain single-contact pair control units.

[0023] In a further aspect of the invention, a control

device is provided, as set forth in claim 8, which comprises an electrical box and one or more double-contact control units of the present invention.

[0024] Advantageous embodiments of the invention are obtained in accordance with the dependent claims.

Brief description of the drawings

[0025] Further features and advantages of the invention will be more apparent from the detailed description of preferred, non-exclusive embodiments of the control unit and the device of the invention, which are described as non-limiting examples with the help of the annexed drawings, in which:

FIGS. 1 and 2 are sectional views of a control unit of the invention in a first preferred configuration;
FIGS. 3 and 4 are sectional views of a control unit of the invention in a second preferred configuration;
FIG. 5 is a sectional view of a control unit of the invention in a third preferred configuration and in an actuation sequence;

FIG. 6 is a perspective exploded view of a control device of the invention according to a first preferred configuration;

FIG. 7 is a perspective view of a portion of a control device of the invention according to a second preferred configuration;

FIG. 8 is a lateral broken-away view of a control device of the invention according to a third preferred configuration;

FIG. 9 is a perspective view of a portion of a control device of the invention according to a fourth preferred configuration;

FIG. 10 is a front bottom view of a control device of the invention according to a fifth preferred configuration;

FIG. 11 is a lateral broken-away view of the control device of Fig. 10.

Detailed description of a preferred embodiment

[0026] Referring to the above figures, a control unit of the invention, generally designated by numeral 1, may be mounted to one or more electric circuit of an electric plant, not shown in the accompanying drawings and known per se, to control opening and closing thereof in a selective and controlled manner.

[0027] For example, the control unit 1 may be simultaneously connected to a main power supply circuit for powering a movable part of the plant and to an auxiliary safety circuit, such as a warning, emergency or alarm circuit, to trigger the latter at the same time as the main circuit is opened, thereby ensuring the requested safety.

[0028] Particularly, the control unit 1 may be connected to the stationary part of the electric plant through a support element, such as an electrical box 2 or an anchor panel 3.

[0029] As particularly shown in Figs. 1 and 3, a double-contact control unit 1 of the invention comprises an insulation support 4 which is adapted to be removably anchored to a particular support element 2, 3 and has a longitudinal axis L and a predetermined axial length 1.

[0030] First and second pairs of fixed electric contacts, 5, 5' and 6, 6', are arranged in the insulation support 4, and are associated with respective electric terminals 7, 7'; 8, 8' through respective substantially transverse conductive plates 9, 9'; 10, 10' for electric connection to respective electric circuits of the plant.

[0031] Furthermore, each terminal 7, 7'; 8, 8' is accommodated in a respective seat 11, 11'; 12, 12', which is formed in the support 4 and has a substantially elongate shape in a main direction of extension X, X'; Y, Y'.

[0032] The support 4 also houses first and second pairs of movable electric contacts, 12, 12' and 14, 14' which are spaced at a predetermined maximum axial distance d and are adapted to be selectively moved to contact with the fixed contacts 5, 5'; 6, 6' of a respective pair, in any manner known to the skilled person.

[0033] According to a peculiar feature of the invention, the terminals 7, 7' of one of the pairs of fixed contacts 5, 5' are located in symmetric positions with respect to the longitudinal axis L, at distances and inclination angles a differing from those of the terminals 8, 8' of the other pair of fixed contacts 6, 6' to be at least partially transversely aligned therewith to reduce the longitudinal offset of the pairs of fixed contacts 5, 5'; 6, 6' and the axial length 1 of the support 4.

[0034] Particularly, the plates 9, 9' of the pair associated with one of the pairs of fixed contacts 5, 5' have a transverse dimension w that is larger than the transverse dimension z of the plates 10, 10' of the other pair, such that their respective terminals 7, 7' may be arranged at a longer distance from the longitudinal axis L, as compared with the other pair of terminals 8, 8'.

[0035] Furthermore, the housing seats 11, 11' of the electric terminals 7, 7' associated with the conductive plates 9, 9' having the larger transverse dimension w have respective directions of extension inclined to the longitudinal axis L.

[0036] Thus, such housing seats 11, 11' are at least partially transversely aligned with the seats 12, 12' of the terminals 8, 8' connected to the other pair of fixed contacts 6, 6'.

[0037] This particular configuration will reduce the longitudinal offset of the pairs of fixed contacts 5, 5'; 6, 6' and, as a result, the maximum axial distance d between the pairs of movable contacts 13, 13'; 14, 14' to obtain a support 4 having a relatively small length 1, substantially comparable to the length of the insulation supports that are typically used for the control units having a single pair of movable contacts, thereby allowing them to be accommodated in an electrical box 2.

[0038] As shown in the figures, the support 4 substantially has a box-like shape and is symmetric with respect to the longitudinal axis L, with an upper front face 15 and

a lower front face 16, which are substantially flat, opposed and parallel to each other.

[0039] Particularly, one of such front faces 15, 16 is equipped with snap anchor means 17 which are adapted to be removably connected to respective seats, appropriately formed in the support element 2, 3 as described below.

[0040] For instance, as shown in Figs. 1 and 2, the anchor means 17 may be associated with the upper face 15. Such configuration is preferred if the control unit 1 is designed to be anchored to a fixation panel 3, as shown in Figs. 10 and 11, described below in greater detail.

[0041] Here, even when the unit 1 is not designed to be housed in an electrical box, there will be the undoubted advantage that the control unit 1 is more compact and has lower space requirements.

[0042] Figs. 3 and 4 show a control unit 1 having the anchor means 17 associated with the lower face 16 of the support 4 for removable anchorage of the bottom wall of an electrical box 3, as shown in Figs. 6 to 9, also described in greater detail below.

[0043] In both configurations, according to a preferred non-limiting embodiment of the invention, the snap anchor means 17 may include a pair of coupling elements 18, 19 moving along the same transverse axis Z in opposite directions.

[0044] Particularly, each coupling element 18, 19 slides transversely against a respective return spring 20, 21 or the like, housed in the support 4 and adapted to force the corresponding coupling element 18, 19 toward the closed position.

[0045] As a further particularly advantageous aspect, the seats 11, 11'; 12, 12' for the terminals 7, 7'; 8, 8' may have respective holes 22, 22'; 23, 23' for access to respective terminals 7, 7'; 8, 8'.

[0046] Such access holes 22, 22'; 23, 23' are formed in the support 4 at the front face 15, 16 with no anchor means 17, to facilitate insertion of a tool, such as a screwdriver or the like, for tightening or removing the corresponding terminal 7, 7'; 8, 8'.

[0047] The conductive plates 9, 9' with the larger transverse dimension w have first end portions 24, 24' equipped with respective fixed contacts 5, 5' and second end portions 25, 25' equipped with respective terminals 7, 7'.

[0048] The second end portions 25, 25' are appropriately inclined to the longitudinal axis L at equal and opposite inclination angles for the respective terminals 7, 7' to be arranged substantially parallel to the directions of extension X, x' of the corresponding housing seats 11, 11'.

[0049] Thus the seats 11, 11' for the terminals 7, 7' can be easily accessed by an operator using an appropriate tool, although the support 4 is very compact, in both longitudinal and transverse directions.

[0050] By way of example and without limitation, the inclination angle of the second end portions 25, 25' of the conductive plates 9, 9' may range from 10° to 85°,

more preferably from 60° to 80°.

[0051] Therefore, the inclination angle α of the terminals 7, 7' is complementary to the inclination angle of the second end portions 25, 25'.

[0052] The conductive plates 9, 9' having the larger transverse dimension w may be appropriately shaped with a first end portion 24, 24' substantially transverse and orthogonal to the longitudinal axis L and a substantially longitudinal intermediate portion connecting the two end portions 24, 25; 24', 25'.

[0053] The second end portion 25, 25' may also have a substantially transverse section that connects the inclined section to the intermediate portion.

[0054] Conversely, the conductive plates 10, 10' having the smaller transverse dimension z are appropriately shaped with end portions substantially transverse and orthogonal to the longitudinal axis L and a substantially longitudinal intermediate portion connecting the two end portions.

[0055] This configuration will allow the terminals 7, 7'; 8, 8' to be accommodated in the support 4 such that the latter may still have a compact size while allowing simple access to the former as the access holes 22, 22'; 23, 23' are transversely offset from each other.

[0056] In a preferred configuration of the invention, the control unit 1 comprises substantially longitudinal actuating means 27 associated with the first and the second pairs of movable electric contacts 13, 13'; 14, 14', to move the latter along a substantially longitudinal common actuation axis, e.g. coincident with the axis of symmetry L.

[0057] This particular configuration allows use of actuator means having a high degree of safety, complying with the standards in force.

[0058] The actuating means 27 may be known per se and include, by way of example, a slider 28 sliding in a longitudinal guide 29 formed at the center of the support 4.

[0059] The slider 28 has an upper end 30 adapted to interact with a pushbutton for actuating the control device to which the unit 1 is mounted, e.g. the emergency mushroom pushbutton 31 as shown in Fig. 6.

[0060] On the other hand, the lower end 32 of the slider 28 is associated with a pair of bridges 33, 34, each having one of the pairs of movable contacts 13, 13'; 14, 14'.

[0061] Particularly, the two contact-holding bridges 33, 34 are housed in a cavity 35 formed in the slider 28 and the lower bridge 34 connected to the second pair of movable contacts 14, 14' is integrated with the lower end 32 of the slider 28 to translate integral therewith.

[0062] On the other hand, the slider 28 is designed to only engage the upper bridge 33 once it has covered a first length of its maximum longitudinal stroke.

[0063] Fig. 5 shows a further configuration of a control unit 1 of the invention, in which one of the fixed contacts 50 of one of the pairs is stably electrically connected to one of the fixed contacts 6' of the other pair, e.g. by a connecting bridge 52 for electrical connection of the two corresponding bridges 7', 8', to define a self-monitored

contact unit 1, which is designed to electrically warn, by opening the circuit, that the actuating pushbutton 31 has moved away from the contact unit 1, e.g. in case of improper mounting, or improper assembly of the box 2.

[0064] Fig. 5 also shows an operating sequence for said self-monitored control unit 1, indicating that, once a first length of the longitudinal stroke of the slider 28 has been covered, the second pair of movable contacts 14, 14' is only caused to move, whereas the first pair of movable contacts 13, 13' remains in contact with the corresponding first pair of fixed contacts 5, 5'.

[0065] After contact of the second pair of movable contacts 14, 14' with the second pair of fixed contacts 6, 6', the slider 28 will engage the upper bridge 33 to pull it along the longitudinal actuation axis L and cause the corresponding circuit to open.

[0066] As is known in the art, two elastic counteracting elements are provided, one of which, referenced 36, will act upon the slider 28 to counteract its longitudinal sliding motion, and the other, referenced 37, will be interposed between the contact-holding bridges 33, 34.

[0067] Fig. 6 shows a first configuration of a control device for electric plants as disclosed by the invention, generally referenced 38, which comprises the control unit 1 as described above and shown in Figs. 3 and 4.

[0068] Particularly, the device 38 comprises an electrical box 2 having an inner housing 39 of predetermined height h which is adapted to accommodate one or more control units 1.

[0069] Particularly, the electrical box 2 is composed of an upper half-shell 40 and a lower half-shell 41, which are designed to be connected together, e.g. by screw means 42.

[0070] The inner housing 39 has an upper wall 43 with one or more passages 44 formed therein to receive respective control pushbuttons, such as an emergency mushroom pushbutton 31, actuating pushbuttons, selectors or the like, and a bottom wall 45 configured for removable anchorage of one or more control units 1 to be associated with respective control pushbuttons.

[0071] Appropriately, the axial length 1 of the support 4 of the control unit 1 is substantially similar or slightly smaller than the height h of the inner housing 39, as more clearly shown in Fig. 7, thereby allowing insertion of the control unit 1 of the invention having two pairs of movable contacts 13, 13'; 14, 14' into the electrical box 2.

[0072] The support 4 is equipped with a pair of connection elements 18, 19 as described above at its lower front face 16, to allow removable coupling with the bottom wall 45 of the housing 39.

[0073] The latter in turn comprises at least one pair of holding members 46, 47, adapted for snap engagement by respective coupling elements 18, 19 of the support 4.

[0074] Particularly, the bottom wall 45 may have a plurality of pairs of holding members 46, 47, which are adapted to be selectively and modularly engaged by corresponding coupling elements 18, 19 of one or more respective control units 1, 1', 1".

[0075] The control units 1, 1', 1" adapted to be inserted into a common electrical box 2 may also differ from each other, e.g. be all according the present invention as shown in Fig. 7.

[0076] Alternatively, one or more single-contact pair control units 1" may be provided in addition to one or more control units 1 of the present invention, as shown in Fig. 8.

[0077] Fig. 9 shows a further configuration for the electrical box 2, designed for use in common control push-button panels.

[0078] Finally, Figs. 10 and 11 shows a further variant of the control device of the invention, generally referenced 49, having a control unit 1 as shown in Figs. 1 and 2, i.e. having the anchor means 17 associated with the upper front face 15.

[0079] Here, the device 48 will comprise a support element defined by a fastening panel 4 having both a central passage 49 for receiving a control pushbutton, e.g. an emergency mushroom pushbutton 50, and one or more seats 51 for mounting and removable anchorage of corresponding control units 1, 1", not necessarily all according to the present invention. Such seats 51 are appropriately arranged at the periphery of the central passage 49.

[0080] The above disclosure clearly shows that the invention fulfills the intended objects and particularly meets the requirement of providing a double-contact control unit for electric plants, e.g. of the type having two pairs of movable contacts and two pairs of fixed contacts, that is particularly compact, allowing insertion thereof into standard electrical boxes, as typically used with control units having single pairs of fixed and movable contacts.

Claims

1. A double contact control unit for electric plants, anchorable to a fixed or movable support element (2, 3) of an electric plant, wherein the control unit comprises:

- an insulating support (4) having a longitudinal axis (L) and a predetermined axial length (l);
- two pairs of fixed contacts (5, 5'; 6, 6') mounted on said support (4) in longitudinally offset positions and connectable to corresponding electrical circuits associated to the plant to cooperate with respective pairs of movable contacts (13, 13'; 14, 14') for opening/closing said electrical circuits, each of said fixed contacts (5, 5'; 6, 6') being associated to a respective electric connection terminal (7, 7'; 8, 8');

wherein the terminals (7, 7'; 8, 8') of each of said pairs of fixed contacts (5, 5'; 6, 6') are positioned symmetrically relative to said longitudinal axis (L), characterised by said terminals having distances and

inclination angles (α) different with respect to the terminals (7, 7'; 8, 8') of the other of said pairs of fixed contacts (5, 5'; 6, 6') in positions at least partially transversally aligned therewith in such a manner to reduce the longitudinal offset of said pairs of fixed contacts (5, 5'; 6, 6') and the axial length of said support (4), wherein the fixed contacts (5, 5'; 6, 6') of each of said pairs are stably connected to respective terminals (7, 7'; 8, 8') by means of transverse conductive plates (9, 9'; 10, 10'), the plates (9, 9') of one of said fixed contacts (5, 5') having respective transverse dimension (w) larger than the transverse dimension (z) of the plates (10, 10') associated to the other pairs of said fixed contacts (6, 6'), the plates (9, 9') with larger dimension (w) having first end portions (24, 24') provided with respective fixed contacts (5, 5') and second end portions (25, 25') provided with respective terminals (7, 7') and inclined with respect of said longitudinal axis (L) with equal and opposite inclination angles to incline the respective terminals (7, 7') with the corresponding inclination angle (α).

2. Control unit as claimed in claim 1, wherein said support (4) is substantially box-like with substantially transverse opposite upper front face (15) and lower front face (16) parallel with each other, one of said front faces (15, 16) being provided with snap anchoring means (17) adapted to removably couple with respective seats of the support element (2, 3).
3. Control unit as claimed in claim 2, wherein each of said terminals (7, 7'; 8, 8') is housed in a respective housing seat (11, 11'; 12, 12') having an entry hole (22, 22'; 23, 23') made into said support (4) at the front face (15, 16) having no anchoring means (17).
4. Control unit as claimed in any preceding claim, wherein substantially longitudinal actuation means (27) are provided which are associated to said pairs of movable contacts (13, 13'; 14, 14') to move them along a same substantially longitudinal actuation axis (L).
5. Control unit as claimed in any preceding claim, wherein one (5') of said fixed contacts of one of said pairs is stably electrically connected to one (6') of said fixed contacts of the other of said pairs to define a self-monitored control unit (1),
6. A control device for electrical plants, comprising:
 - an electric box (2) with an inner housing (39) with predetermined height (h) having an upper wall (43) and a bottom wall (45);
 - one or more control units (1, 1', 1'', 1''') housed into said inner housing (39) of said electric box (2) and connectable to a control circuit of an elec-

tric plant to control the opening and the closing thereof;

characterized in that said at least one or more of said control units (1, 1', 1'', 1''') is in accordance with one or more of the preceding claims and includes an insulation support (4) removably anchored to said bottom wall (45) of said housing (39) and a predetermined axial length (1) substantially close to or slightly shorter than said predetermined height (h) of said housing (39).

7. Device as claimed in claim 6, **characterized in that** said support (4) of said at least one control unit (1, 1', 1'', 1''') is substantially box-like with an upper front face (15) and a lower front face (16) provided with a pairs of anchoring members (18, 19) for removably coupling to said bottom wall (45) of said housing (39).
8. Device as claimed in claim 7, **characterized in that** said bottom wall (45) of said housing (39) comprises at least one pairs of holding members (46, 47) snap engageable with respective anchoring members (18, 19) of said support (4).
9. Device as claimed in claim 8, **characterized in that** said bottom wall (45) of said housing (39) has a plurality of said pairs of holding members (46, 47) selectively and modularly engageable with corresponding anchoring members (18, 19) of said one or more control units (1, 1', 1'', 1''').

Patentansprüche

1. Eine Steuereinheit mit doppeltem Kontakt für elektrische Anlagen, die verankerbar ist an einem festen oder beweglichen Tragelement (2, 3) einer elektrischen Anlage, wobei die Steuereinheit aufweist:
 - einen isolierenden Träger (4) mit einer longitudinalen Achse (L) und einer vorbestimmten axialen Länge (l),
 - zwei Paaren fester Kontakte (5, 5', 6, 6'), die an dem Träger (4) in longitudinal versetzten Positionen montiert sind und verbindbar sind mit entsprechenden elektrischen Schaltungen, die der Anlage zugehörig sind zum Zusammenwirken mit jeweiligen Paaren beweglicher Kontakte (13, 13', 14, 14') zum Öffnen/Schließen der elektrischen Schaltungen, wobei jeder der festen Kontakte (5, 5', 6, 6') einem jeweiligen Verbindungsanschluss (7, 7', 8, 8') zugeordnet ist,
- wobei die Anschlüsse (7, 7', 8, 8') von jedem der Paare fester Kontakte (5, 5', 6, 6') symmetrisch angeordnet sind mit Bezug auf die longitudinale Achse (L), **dadurch gekennzeichnet, dass** die Anschlüsse

se Abstände und Neigungswinkel (α) aufweisen, die sich unterscheiden von den Anschlüssen (7, 7', 8, 8') des anderen der Paare fester Kontakte (5, 5', 6, 6') in Positionen, die zumindest teilweise transversal derart dazu ausgerichtet sind, dass der longitudinale Versatz des Paares fester Kontakte (5, 5', 6, 6') und die axiale Länge des Trägers (4) reduziert sind, wobei die festen Kontakte (5, 5', 6, 6') von jedem dieser Paare stabil verbunden sind mit jeweiligen Anschlüssen (7, 7', 8, 8') mittels transversal leitender Platten (9, 9', 10, 10'), wobei die Platten (9, 9') von einem der festen Kontakte (5, 5') jeweils eine transversale Abmessung (w) aufweisen, die größer ist als die transversale Abmessung (z) der Platten (10, 10'), die dem anderen Paar der festen Kontakte (6, 6') zugeordnet sind, wobei die Platten (9, 9') mit größerer Abmessung (w) erste Endabschnitte (24, 24') haben, die mit jeweils festen Kontakten (5, 5') versehen sind und zweite Endabschnitte (25, 25'), die jeweils mit Anschlüssen (7, 7') versehen sind und geneigt sind mit Bezug auf die longitudinale Achse (L) mit gleichen und entgegen gesetzten Neigungswinkeln zum Neigen der jeweiligen Anschlüsse (7, 7') mit dem entsprechenden Neigungswinkel (α).

2. Steuereinheit gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der Träger (4) im Wesentlichen kastenartig ist mit im Wesentlichen transversalen, gegenüber liegender oberer Stirnseite (15) und unterer Stirnseite (16), die parallel zueinander sind, wobei eine der Stirnseiten (15, 16) versehen ist mit Schnappverankerungs-Einrichtungen (17), die ausgelegt sind für lösbare Verbindung mit jeweiligen Sitzen des Trägerelements (2, 3).
3. Steuereinheit gemäß Anspruch 2, **dadurch gekennzeichnet, dass** jeder der Anschlüsse (7, 7', 8, 8') untergebracht ist in einem jeweiligen Gehäusesitz (11, 11', 12, 12') mit einer Eingangsöffnung (22, 22', 23, 23'), die in dem Träger (4) an der Stirnseite (15, 16) ohne Befestigungseinrichtungen (17) angebracht ist.
4. Steuereinheit gemäß einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** im Wesentlichen longitudinale Betätigungseinrichtungen (27) vorgesehen sind, die den Paaren beweglicher Kontakte (13, 13', 14, 14') zugeordnet sind, um diese entlang einer selben, longitudinalen Betätigungsachse (L) zu bewegen.
5. Steuereinheit gemäß einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** einer der festen Kontakte (5') von einem dieser Paare elektrisch stabil verbunden ist mit einem der festen Kontakte (6') des anderen der Paare, um eine selbst überwachte Steuereinheit (1) zu bilden.

6. Eine Steuervorrichtung für elektrische Anlagen mit

- einem elektrischen Kasten (2) mit einem inneren Gehäuse (39) mit vorbestimmter Höhe (h) mit einer oberen Wand (43) und einer unteren Wand (45),
- einer oder mehreren Steuereinheiten (1, 1', 1'', 1'''), die in dem inneren Gehäuse (39) des elektrischen Kastens (2) untergebracht sind und verbunden werden kann mit einer Steuerschaltung einer elektrischen Anlage, um deren Öffnen und Schließen zu steuern,

dadurch gekennzeichnet, dass mindestens eine oder mehrere der Steuereinheiten (1, 1', 1'', 1''') in Übereinstimmung mit einem oder mehreren der vorhergehenden Ansprüche ist und einen isolierenden Träger (4) beinhaltet, der lösbar verankert ist an der unteren Wand (45) des Gehäuses (39) und eine vorbestimmte axiale Länge (l), die im Wesentlichen nahe oder etwas kürzer als die vorbestimmte Höhe (h) des Gehäuses (39).

7. Vorrichtung gemäß Anspruch 6, **dadurch gekennzeichnet, dass** der Träger (4) der mindestens einen Steuereinheit (1, 1', 1'', 1''') im Wesentlichen kastenartig ist mit einer oberen Stirnseite (15) und einer unteren Stirnseite (16), die versehen sind mit einem Paar Verankerungselemente (18, 19) zur lösbaren Verbindung mit der unteren Wand (45) des Gehäuses (39).
8. Vorrichtung gemäß Anspruch 7, **dadurch gekennzeichnet, dass** die untere Wand (45) des Gehäuses (39) mindestens ein Paar Halteelemente (46, 47) aufweist für Schnappeingriff mit jeweils Verankerungselementen (18, 19) des Trägers (4).
9. Vorrichtung gemäß Anspruch 8, **dadurch gekennzeichnet, dass** die untere Wand (45) des Gehäuses (39) eine Vielzahl des Paares von Halteelementen (46, 47), die wahlweise und modular in Eingriff bringbar sind mit entsprechenden Verankerungselementen (18, 19) dieser einen oder mehreren Steuereinheiten (1, 1', 1'', 1''').

Revendications

1. Unité de commande à doubles contacts pour installations électriques, pouvant être ancrée à un élément support fixe ou mobile (2, 3) d'une installation électrique, dans laquelle l'unité de commande comprend:
 - un support isolant (4) ayant un axe longitudinal (L) et une longueur axiale prédéfinie (l);
 - deux paires de contacts fixes (5, 5'; 6, 6') mon-

tées sur ledit support (4) dans des positions longitudinalement décalées et pouvant être connectées à des circuits électriques correspondants associés à l'installation pour coopérer avec des paires respectives de contacts mobiles (13, 13'; 14, 14') pour ouvrir/fermer lesdits circuits électriques, chacun desdits contacts fixes (5, 5'; 6, 6') étant associé à une borne de connexion électrique respectif (7, 7'; 8, 8');

dans laquelle les bornes (7, 7'; 8, 8') de chacune desdites paires de contacts fixes (5, 5'; 6, 6') sont placés symétriquement par rapport audit axe longitudinal (L), **caractérisée en ce que** lesdites bornes ont des distances et des angles d'inclinaison (α) différents par rapport aux bornes (7, 7'; 8, 8') de l'autre desdites paires de contacts fixes (5, 5'; 6, 6') et dans des positions au moins en partie transversalement alignées avec celles-ci de manière à réduire le décalage longitudinal desdites paires de contacts fixes (5, 5', 6, 6') et la longueur axiale dudit support (4), dans laquelle les contacts fixes (5, 5'; 6, 6') de chacune desdites paires sont connectés stablement à des bornes respectives (7, 7'; 8, 8') au moyen de plaques conductrices transversales (9, 9'; 10, 10'), les plaques (9, 9') de l'un desdits contacts fixes (5, 5') ayant des dimensions transversales (w) respectives plus grandes que les dimensions transversales (z) des plaques (10, 10') associées aux autres paires desdits contacts fixes (6, 6'), les plaques (9, 9') de dimensions plus grandes (w) ayant des premières portions d'extrémité (24, 24') munies de contacts fixes respectifs (5, 5') et des secondes portions d'extrémité (25, 25') munies de bornes respectives (7, 7') et inclinées par rapport audit axe longitudinal (L) avec des angles d'inclinaison égaux et opposés pour incliner les bornes respectives (7, 7') avec l'angle d'inclinaison correspondant (α).

2. Unité de commande selon la revendication 1, dans laquelle ledit support (4) est sensiblement en forme de boîte avec une face avant supérieure (15) et une face avant inférieure (16) transversales opposées qui sont parallèles entre elles, l'une desdites faces avant (15, 16) étant munie de moyens d'ancrage à déclic (17) pouvant être accouplés de manière amovible avec des sièges respectives se l'élément support (2, 3).
3. Unité de commande selon la revendication 2, dans laquelle chacune desdites bornes (7, 7'; 8, 8') est logée dans un siège de logement (11, 11'; 12, 12') ayant un trou d'entrée (22, 22'; 23, 23') formé dans ledit support (4) au niveau de la face avant (15, 16) sans moyens d'ancrage (17).
4. Unité de commande selon l'importe laquelle des revendications précédentes, dans laquelle des

moyens d'actionnement sensiblement longitudinal sont prévus, qui sont associés auxdites paires de contacts mobiles (13, 13'; 14, 14') pour les déplacer le long d'un même axe d'actionnement sensiblement longitudinal (L).

5. Unité de commande selon n'importe laquelle des revendications précédentes, dans laquelle l'un (5') desdits contacts fixes de l'une desdites paires est connecté électriquement de façon stable à l'un (6') desdits contacts fixes de l'autre desdites paires pour définir une unité de commande auto-surveillée (1).
6. Dispositif de commande pour des installations électriques, comprenant:

- un boîtier électrique (2) avec un logement intérieur (39) ayant une hauteur prédéfinie (h) et comportant une paroi supérieure (43) et une paroi inférieure (45);
- une ou plusieurs unités de commande (1, 1', 1'', 1''') logées dans ledit logement intérieur (39) dudit boîtier électrique (2) et pouvant être connectées à un circuit de commande d'une installation électrique pour en commander l'ouverture et la fermeture;

caractérisé en ce que lesdites au moins une ou plusieurs desdites unités de commande (1, 1', 1'', 1''') sont selon une ou plusieurs des revendications précédentes et comprennent un support isolant (4) ancré de manière amovible à ladite paroi inférieure (45) dudit logement (39) et ayant une longueur axiale (l) prédéfinie sensiblement proche à ou légèrement inférieure à ladite hauteur prédéfinie (h) dudit logement (39).

7. Dispositif selon la revendication 6, **caractérisé en ce que** ledit support (4) de ladite au moins une unité de commande (1, 1', 1'', 1''') est sensiblement en forme de boîte avec une face avant supérieure (15) et une face avant inférieure (16) munies d'une paire d'éléments d'ancrage (18, 19) qui en permettent l'accouplement amovible à ladite paroi inférieure (45) dudit logement (39).
8. Dispositif selon la revendication 7, **caractérisé en ce que** ladite paroi inférieure (45) dudit logement (39) comprend au moins une paire d'éléments de retenue (46, 47) pouvant s'engager à déclic avec des éléments d'ancrage (18, 19) respectifs dudit support (4).
9. Dispositif selon la revendication 8, **caractérisé en ce que** ladite paroi inférieure (45) dudit logement (39) comporte une pluralité desdites paires d'éléments de retenue (46, 47) pouvant s'engager de manière sélective et modulaire avec des éléments d'an-

cage correspondants (18, 19) desdites une ou plusieurs unités de commande (1, 1', 1", 1''').

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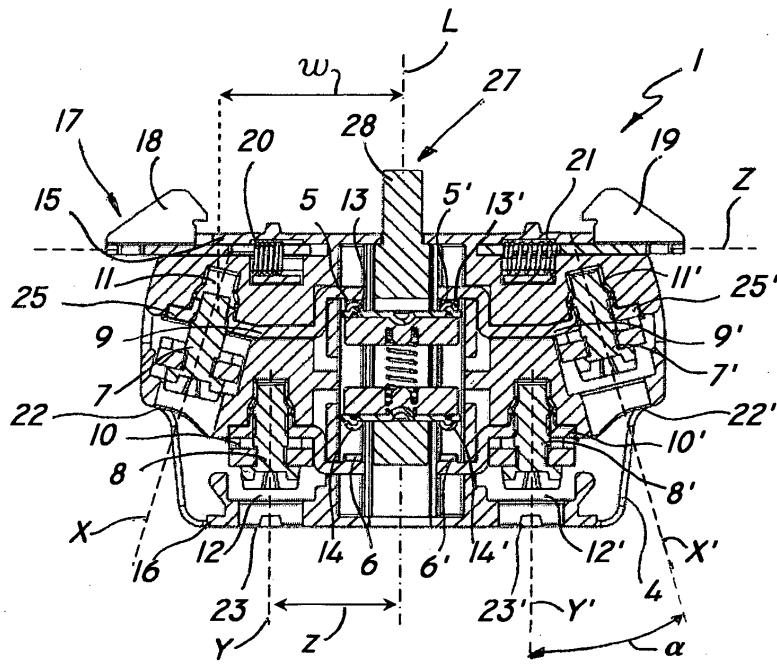


FIG. 1

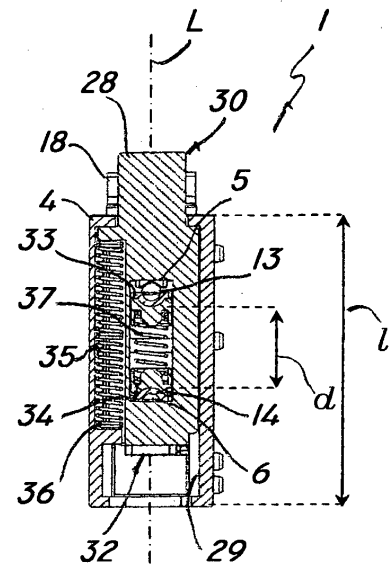


FIG. 2

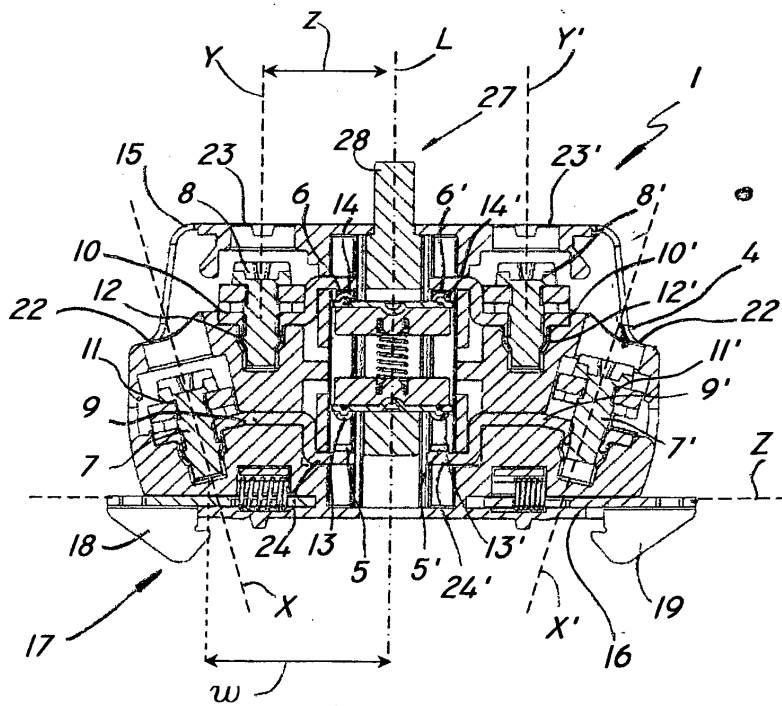


FIG. 3

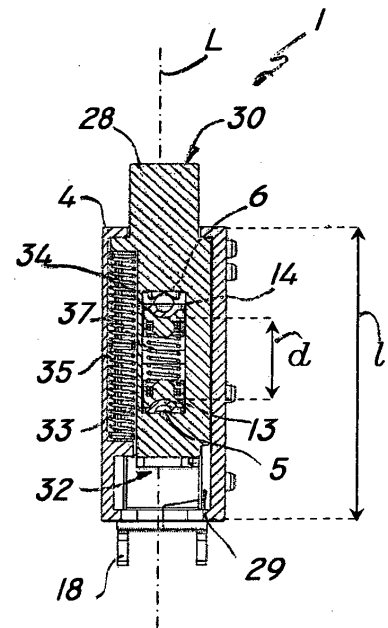


FIG. 4

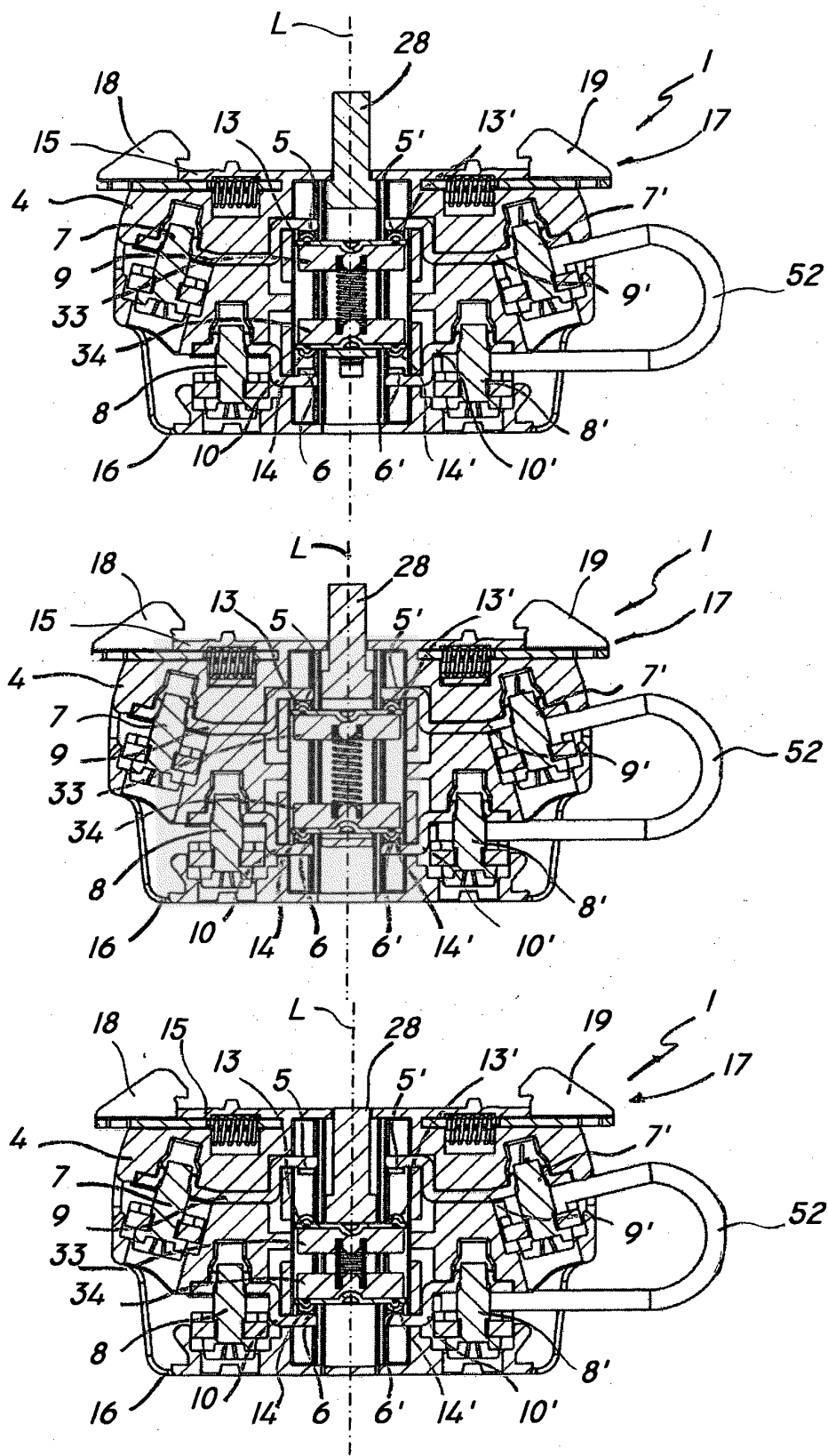


FIG. 5

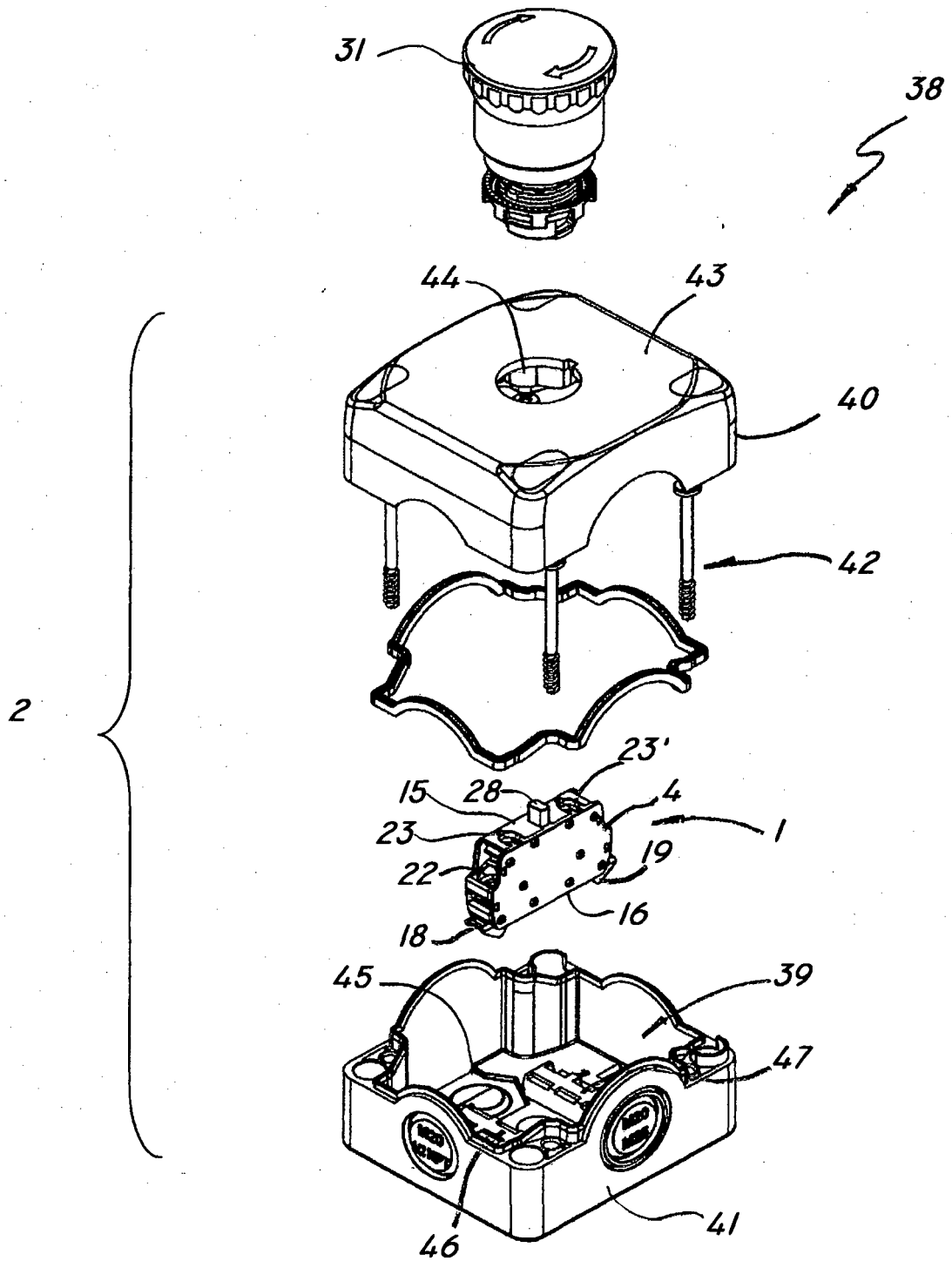


FIG. 6

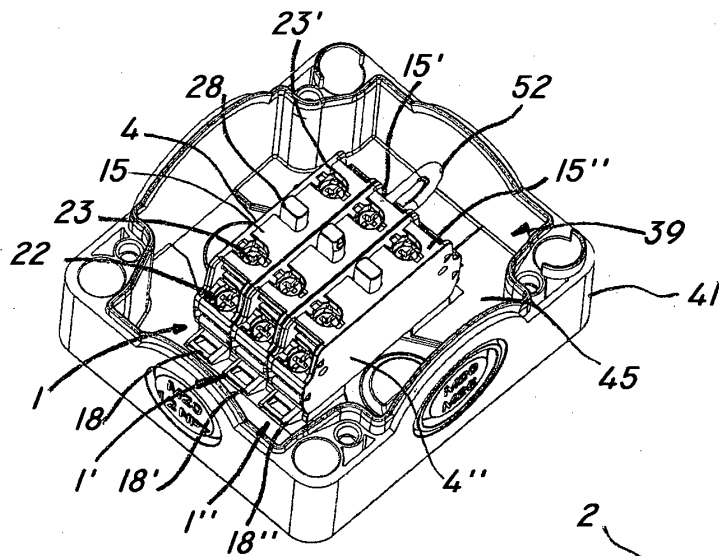


FIG. 7

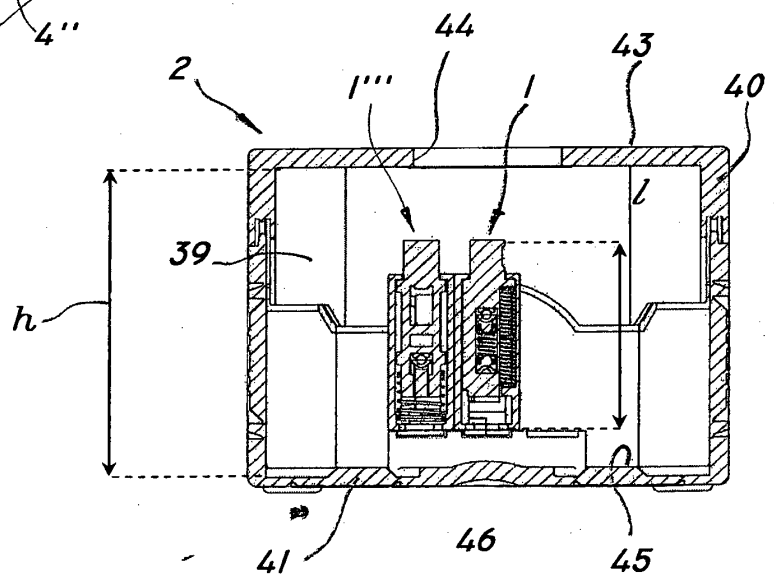


FIG. 8

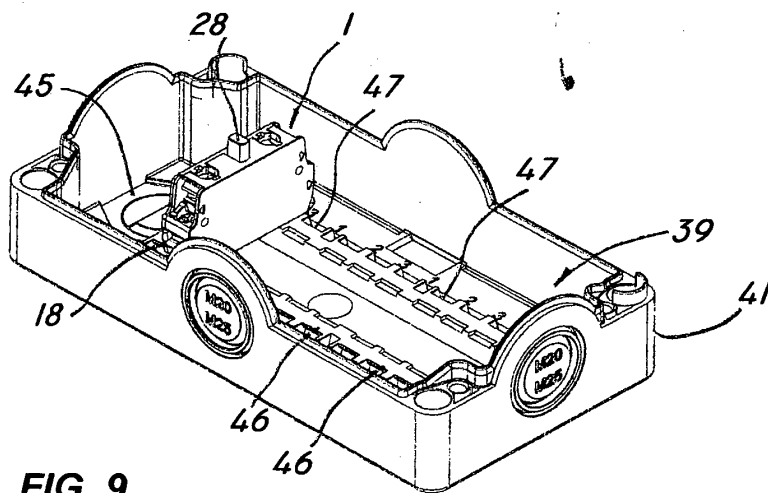


FIG. 9

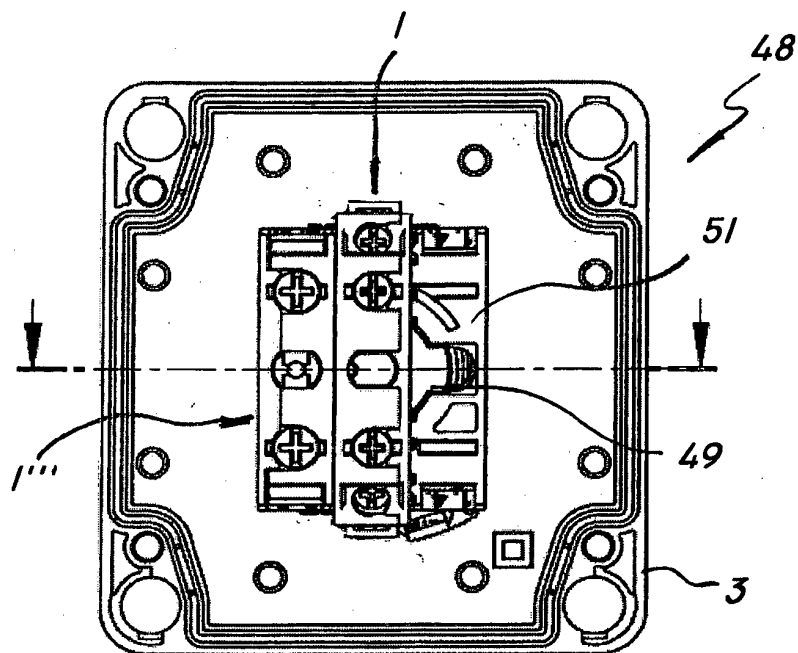


FIG. 10

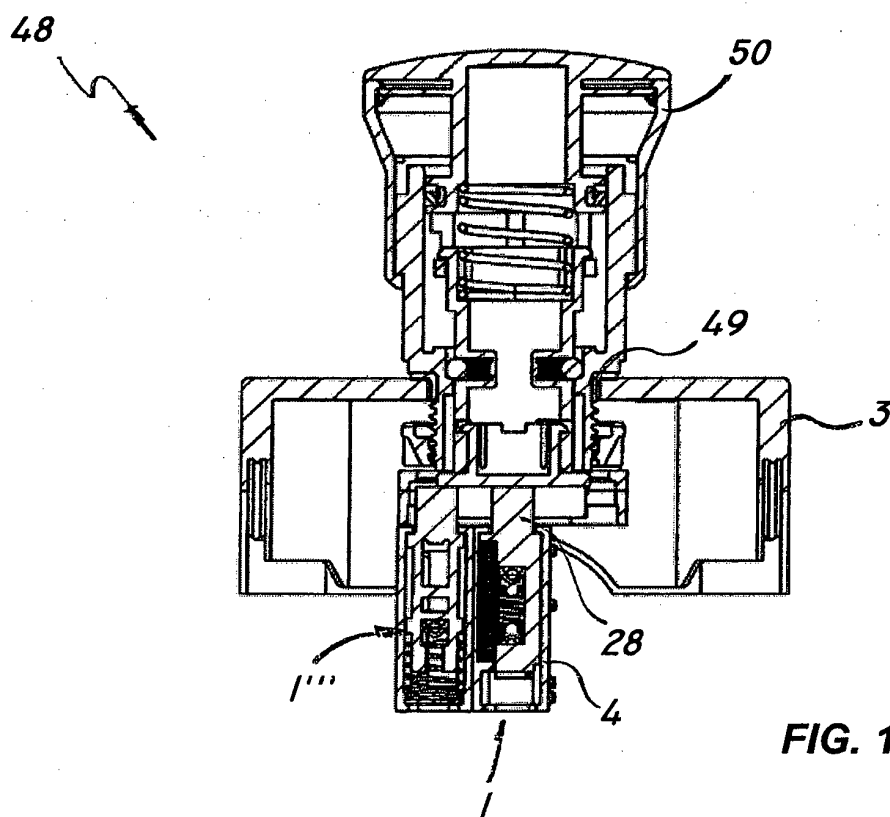


FIG. 11

REFERENCES CITED IN THE DESCRIPTION

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